Do I Belong?

How Negative Intellectual Stereotypes Undermine People's Sense of Social Belonging in School

and How to Fix It

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Abstract

An important consequence of negative stereotypes that impugn non-Asian ethnic minorities' intellectual ability and women's mathematical ability is to convey to the targets of these stereotypes that they are not seen as individuals, that they may not be fully valued or respected—that they may not belong—in academic settings. In this chapter, we review research demonstrating that people who contend with numeric underrepresentation and with negative stereotypes in mainstream academic and professional arenas are vigilant for cues that could communicate they do not belong or are not fully included in these settings. When encountered, such cues can undermine people's sense of belonging, motivation, and achievement.

Further, this chapter reviews effective remedies—strategies to buttress students' sense of social belonging in academic environments. These strategies aim to forestall negative attributions for social events in school—to lead students to see social adversity as normal and nondiagnostic of a lack of belonging. As tested in randomized intervention field experiments, variants of this intervention have improved school outcomes among Black college students, Black middle school students, and female engineering students even over long periods of time. One hour-long social-belonging intervention delivered in students' freshman year improved Black students' college grades from sophomore-through-senior year, and reduced the achievement gap between Black and White students over this period by 52%. Implications for psychological process, for stereotype threat, and for efforts to ameliorate social inequality are discussed.

In the spring of 1985, a promising young African American student graduated from Princeton University and wrote her senior thesis on the experiences of African Americans on campus. She introduced the topic from personal experience

> My experiences at Princeton have made me far more aware of my "Blackness" than ever before . . . no matter how liberal and open-minded some of my White professors and classmates try to be toward me, I sometimes feel like a visitor on campus; as if I really don't belong . . . it often seems as if, to them, I will always be Black first and a student second. (Robinson, 1985, p. 2)

This was Michelle Robinson, who would later become Michelle Obama and First Lady of the United States. Sonia Sotomayor, the first Latina on the Supreme Court, described her own experience at Princeton a decade earlier in strikingly similar terms. She writes of feeling like "a visitor landing in an alien country" and says, "I have spent my years since Princeton, while at law school, and in my various professional jobs, not feeling completely a part of the worlds I inhabit" (Lewis, 2009).

Such feelings seem to be common. In an insightful book, *The Rage of a Privileged Class*, Ellis Cose tells the stories of dozens of successful African Americans who came to question their belonging in mainstream settings. One partner at a law firm tells Cose of arriving at work early one day and, as he searched for his key at the office door, having his credentials questioned by a young White associate. The partner "found himself growing angrier and angrier: 'Because of his color, he felt he had the right to check me out'" (Cose, 1993, pp. 48-49).

Incidents like this illustrate why even highly successful ethnic minorities may come to feel that they do not belong. Experiences in mainstream settings may convey to them that they are not viewed as individuals with distinct interests and talents but as representatives of a group

that is stereotyped as less qualified, less able, and less worthy than others. It is hardly surprising that in the face of experiences like these African Americans might feel that they are seen as, as Michelle Robinson put it, "Black first and a student second."

This chapter reviews research exploring how negative stereotypes affect people's feelings of social belonging in mainstream school and work settings and, over time, their motivation, participation, and achievement in these settings. Of course, Michelle Robinson, Sonia Sotomayor, and many other ethnic minorities have had extraordinarily successful careers in predominantly White settings. But many talented ethnic minorities do not; gaps in academic achievement and professional success between White and non-Asian ethnic minorities, as well as between men and women in quantitative fields, remain a pressing social problems in the United States and many other countries (Hyde, Fennema, & Lamon, 1990; Jencks & Phillips, 1998). Research investigating the social experiences of negatively stereotyped students in mainstream settings can provide novel theoretical insights into factors that contribute to inequality between marginalized and nonmarginalized groups, and reforms to reduce such disparities. We close this chapter with a review of such interventions. By targeting students' sense of social belonging in school, these interventions can raise the academic achievement of negatively stereotyped students and reduce group differences.

We begin with the proposition that social belonging and the experience of being negatively stereotyped are fundamentally antithetical. By *social belonging*, we mean people's perception of the quality of their social relationships in a setting—whether others in that setting include, value, and respect one (see Baumeister & Leary, 1995). A basic tenet of social belonging is that one belongs, at least in part, as an individual—that one's individual qualities, characteristics, and contributions are recognized and valued by others in the setting. Negative

stereotypes, such as stereotypes about African Americans' intellectual abilities and women's quantitative skills, convey to their targets that may be devalued in these settings, that their contributions may not be recognized, that they may not belong. By the same token, effective strategies to buttress people's feelings of social belonging can mitigate the effects of negative stereotypes and improve people's school and work experiences and performance.

This chapter is divided into three sections. First, we discuss research investigating how cues that signal the presence of negative stereotypes affect targets' sense of belonging and motivation in school and work environments. Second, we discuss how social-relational concerns impair intellectual performance in laboratory settings, especially in research investigating stereotype threat. Third, we discuss research examining students' sense of social belonging in field settings, including interventions designed to buttress students' feelings of belonging in school.

Hints of Stereotypes Affect Social Belonging and Motivation

For people who work or study in settings where their group is targeted by negative stereotypes, the world can look very different than it does to others (Steele, 2010). People targeted by negative stereotypes face the possibility that others in the setting could view them as representatives of a devalued group rather than as individuals—"as Black first, and a student second." The prospect that, no matter how well one performs, one could be treated poorly and devalued may cause people from stereotyped groups to be vigilant in academic and professional environments for cues that suggest that they are not fully included and valued. When confronted with such cues, they may question their belonging and lose motivation. People who are not negatively stereotyped in a setting simply do not have to deal with this concern. They might worry about their belonging as a consequence of individual factors, but they need not worry that

they will be reduced to a demeaning group stereotype.

Consistent with this analysis, research shows that people from stereotyped groups can be highly perceptive of cues that convey that they and their group might not belong. In one line of research, Purdie-Vaughns, Steele, Davies, Ditlmann, and Crosby (2008) examined factors affecting African American professionals' trust in a company. Participants read a brochure ostensibly published by a consulting firm depicting either a diverse or a nondiverse workforce. Crossed with this manipulation, half of the brochures described a "colorblind" philosophy, which emphasized that the company trained its "diverse workforce to embrace their similarities" (p. 618). The other half described a "value-diversity" philosophy, which emphasized that, "embracing our diversity enriches our culture" (p. 619).

The researchers then asked participants how much they trusted the company and how comfortable they would feel in it. On their own, neither the nondiverse company nor the colorblindness ideology led African American professionals to distrust the company. But together they carried a threatening meaning: In combination with a lack of diversity, the colorblindness message seemed to convey to participants not fairness but a willful ignorance of the concerns that arise from a stigmatized identity. In this condition participants reported distrusting the company, anticipated feeling uncomfortable in it, and spontaneously expressed concerns about being devalued in the company because of their race.

Another study examined women's response to threatening cues in math, science and engineering (MSE) (Murphy, Steele, & Gross, 2007). Male and female MSE majors watched a video of an MSE conference that depicted either equal numbers of men and women or more men than women. As predicted, although men were unaffected by the gender ratio manipulation, women who saw the gender-unbalanced video exhibited heightened vigilance on both cognitive

and physiological indices. They recalled more details from the video and exhibited greater cardiovascular reactivity. Moreover, women in this condition reported a lower sense of belonging in the conference and less interest in participating in it.

A third line of research found that physical objects alone can signal people that they do not belong (Cheryan, Plaut, Davies, & Steele, 2009). Men and women participated in the study in a room housed in the university computer science department. In one condition, the room was filled with objects pretesting had identified as stereotypical of computer scientists (e.g., a Star Trek poster, junk food). In the other condition, the objects were nonstereotypical (e.g., a nature poster, healthy snacks). In the stereotypical condition, men reported more interest in pursuing computer science than women. But in the nonsterotypical condition, women's interest increased and, if anything, exceeded men's. Subsequent studies found that the stereotypical objects activated a masculine representation of computer science, that this representation undermined women's sense of belonging in the field, and this, in turn, decreased women's interest in pursuing the field.

Why do people who contend with negative stereotypes in academic or professional settings show this sensitivity to such subtle cues? They do so, we suggest, because contending with negative stereotypes can reasonably cause people to feel uncertain about their social belonging (Walton & Cohen, 2007). In this state of *belonging uncertainty*, even minor cues and events may appear to be evidence of nonbelonging. To test this idea more directly, in one study, Black and White students were asked to list either two friends who would fit in well in a field of study or eight friends (Walton & Cohen, 2007, Experiment 1). The researchers reasoned that listing eight friends is difficult, and that students who feel uncertain of their belonging in the field might interpret this difficulty as meaning that they did not belong and could not succeed in

the field (see Schwarz et al., 1991). This prediction was confirmed. Although White students showed no effect of the manipulation, Black students evaluated their belonging and prospects of success in the field far lower in the list-eight-friends condition than in the list-two-friends condition or in a condition where they had not been asked to list any friends. Moreover, Black students seemed to interpret difficulty listing friends as evidence that their group too might not fare well in the field. Given the opportunity to participate in a peer advising program, Black students in the list-eight-friends condition discouraged a Black peer (but not White peers) from pursuing the field at hand. We return to this research and to the idea of belonging uncertainty below in discussing the effects of interventions to buttress students' sense of social belonging.

The research reviewed in this section shows that people whose group is negatively stereotyped in a setting are sensitive to cues—like numeric underrepresentation, diversity ideologies, stereotypical physical objects, and difficulty calling to mind friends in the field—that suggest that they might not belong in that setting. These cues undermine people's sense of social belonging and motivation. In the next section we examine whether social belonging also contributes to decrements in intellectual performance by reviewing laboratory research on stereotype threat.

Social Belonging and Intellectual Performance

Since the first stereotype threat studies were conducted, researchers have investigated whether stereotype threat undermines people's performance expectancies and sense of self-efficacy (e.g., "I/we can't do it"; Stangor, Carr, & Kiang, 1998), if it raises concerns about being devalued in light of the stereotype (e.g., "They think I /we can't do it"; Steele, 2010), or if it triggers both intrapsychic and interpersonal fears (Shapiro Chapter). Many classic stereotype threat manipulations confound these processes. For instance, describing a test as nonevaluative

(Steele & Aronson, 1995) could either boost people's confidence in their ability to perform well or reduce apprehension that their performance will be interpreted through the lens of a demeaning stereotype.

Much past research on the bases of academic motivation and performance emphasizes intrapsychic processes, like people's feelings of self-efficacy and autonomy, which has led many researchers to suggest that such factors contribute to stereotype threat (e.g., Stangor et al., 1998). However, recent research finds that interpersonal factors, such as small cues of social connectedness to others in academic settings, can also have large effects on motivation (Walton & Cohen, in press). These findings suggest that social-relational processes may play an important role in stereotype threat.

Stereotype Threat and Social Belonging

What evidence links social-relational concerns to the performance decrements associated with stereotype threat? To begin, performance expectancies are not a necessary mediator of stereotype threat. Brown, Steele, and Atkins (2001) had White and Black students complete a set of easy practice anagrams to boost their expected performance on a subsequent verbal reasoning test. The test was described as either diagnostic of verbal reasoning ability or, in addition, as racially-fair and nonbiased—an instruction designed to remove stereotype threat. Having completed the practice items, participants uniformly expected to do well on the test. Nonetheless, Black students performed far worse in the diagnostic condition than in the race-fair condition.

Research also provides positive evidence for the role of social-relational concerns in stereotype threat. In an ingenious study, Quinn (2009) disentangled intrapsychic and interpersonal processes by examining a group in which group membership is invisible—people

with a history of mental illness. Quinn assigned students who did and did not have a history of mental illness to one of three conditions. One group of participants completed a background questionnaire that contained no reference to mental illness. In another, the questionnaire asked participants to indicate which if any of various psychological problems and physical disorders (e.g., severe frostbite) they had experienced. Here participants' history of mental illness was both salient to themselves and revealed to the researchers. In the third group, the questionnaire asked participants to indicate only whether they had experienced one of the various psychological and physical maladies listed but did not ask them to specify which one. In this condition, participants' mental illness history was salient to themselves but not revealed to others.

Participants then took a test of "reasoning ability"—a domain in which people with mental illness are negatively stereotyped. Quinn reasoned that if stereotype threat results from an intrapsychic process, both the second and third conditions—where participants had been reminded of their history of mental illness—should undermine performance. But if stereotype threat results from an interpersonal process, only the second condition—where participants believe they have revealed this history publicly—should undermine performance. The latter prediction was confirmed. Both when participants were not reminded of their mental illness history and when participants were reminded of this history but did not reveal it, there was no decrement in performance. But when students revealed their history of mental illness, their scores dropped precipitously and they performed worse than students with no history of mental illness. The results strongly support the role of interpersonal processes in stereotype threat.

Research using brain imaging corroborates this conclusion (Krendl, Richeson, Kelley, & Heatherton, 2008). In this study, women completed a series of math problems under stereotype

threat or not as their brain activation was assessed using functional magnetic resonance imaging (fMRI). Women under stereotype threat performed worse than women not under stereotype threat. They also showed less activation over time of brain regions associated with mathematical computation and learning (e.g., left parietal and prefrontal cortex). In addition, women under stereotype threat showed greater activation over time in brain regions associated with social and emotional processing and, in particular, with the processing of negative social information (e.g., the ventral anterior cingulate cortex). Consistent with Quinn (2009), the results suggest that stereotype threat is a social threat—an apprehension that one could be perceived and devalued in light of a negative stereotype about one's group.

Although this research suggests the importance of interpersonal concerns in contributing to the performance decrements associated with stereotype threat, it is important to note that stereotype threat can also cause damaging intrapsychic processes. For instance people may try to disprove the stereotype to themselves (Shapiro Chapter). One study found that women performed worse on a math test in a threatening circumstance even when they believed that their test performance was completely unlinked to their personal or gender identity (Inzlicht & Ben-Zev, 2003). Such results suggest the multiple mechanisms by which stereotype threat may undermine performance.

Nonetheless, the interpersonal aspect of stereotype threat suggests specific kinds of remedies. Testing such remedies both provides important theory-tests and suggests novel ways to reduce inequality. For instance, changing the social climate in a testing situation to directly address interpersonal concerns could remedy stereotype threat. In an ongoing study, we tested whether creating in participants a sense of working *with* others on a test would forestall apprehensions about being viewed stereotypically and thus mitigate stereotype threat (Carr,

Walton, & Dweck, in prep). Men and women completed a difficult, ostensibly evaluative math test—conditions that evoke stereotype threat. Using a manipulation we have previously validated, we led some participants to feel as though they were working on the test in a psychological sense *with* others, even though in all cases participants worked on the test individually. All participants took part with a male confederate and were led to believe that they had been randomly assigned to receive a tip on the math problems. In the key condition, participants received a tip ostensibly authored by the male confederate and written for the participant. The tip read, "Hey [participant's name], Here's something I find helpful … I hope it helps you too! – [confederate's name]." Although the content of the tip was not substantively helpful, the exchange was designed to create in participants a feeling of working together on the test. In the control condition, participants received the same tip content, but it was attributed to a computer bank. The results were striking. In the control condition, women performed worse than men (51.2% vs. 62.7% correct). But when led to feel they were working with others, women if anything outscored men (69.3% vs. 57.5% correct). Although this study requires replication, it suggests that subtle strategies to create a more supportive and cooperative social climate in testing environments may be an effective means of reducing stereotype threat.

A related remedy is suggested by other recent research. If stereotype threat leads people to feel they are perceived through the lens of a negative stereotype rather than valued as individuals, then leading people to believe that their individual characteristics are recognized and valued should prevent stereotype threat. In one study, women were asked to describe their personal preferences (e.g., favorite food) before completing a math test in conditions that otherwise trigger stereotype threat (Ambady, Paik, Steele, Owen-Smith, & Mitchell, 2004). As predicted, the individuating questions led to better performance. A follow-up study found that

individuation prevented stereotype threat even when it was negatively valenced (i.e., women listed 3 positive and 4 negative personal traits; for a related study, see Gresky, Eyck, Lord, & McIntyre, 2005).

These studies were not designed to examine the role of interpersonal processes in stereotype threat, but they are consistent with our hypothesis. In future research, it would be intriguing if such individuating manipulations are more effective when participants are led to believe that the experimenter has requested and/or will read their individuating information—such results would suggest more directly that the threat lifted by individuating procedures arises in an interpersonal transaction—from a worry about being seen as a token group member rather than as an individual.

This analysis also suggests a novel interpretation for the effects of self-affirmation on stereotype threat. Both laboratory experiments (Martens, Johns, Greenberg, & Schimel, 2006) and intervention field experiments (e.g., Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustowski, 2009; Cohen Chapter) show that self-affirmation—where people write for several minutes about personally important values (e.g., a sense of humor, relationships with friends or family)—can reduce stereotype threat and improve intellectual performance among people from negatively stereotyped groups. For instance, in a series of striking field experiments, Cohen and colleagues (2009) found that a few brief (15-20 minute) self-affirmation exercises improved Black middle school students' grades in core academic classes over two years, in 7th and 8th grade.

Self-affirmation is thought to buttress people's self-integrity—their view of themselves as good, virtuous, and efficacious—and so to reduce stress in threatening situations (Sherman & Cohen, 2006). But it is also possible that self-affirmation signals to people that their personal values are recognized and respected in a setting, reducing their fear of being viewed

stereotypically and buttressing their sense of social belonging. Consistent with this possibility, self-affirmation can cause people to experience positive other-directed emotions, like feelings of love and connectedness (Crocker, Niiya, & Mischkowski, 2008). In addition, content analyses of student essays from the affirmation interventions indicates that students who wrote about issues of social belonging (e.g., about how a value brought them closer to others) gained more in terms of improvement in GPA (Purdie-Vaughns, Shnabel, Cook, Garcia, & Cohen, in prep). The effects of self-affirmation on academic achievement are likely to be multiply mediated, perhaps especially in field contexts (Cohen et al., 2009). But to the extent that social-relational processes contribute to these effects, self-affirmation may be most effective when people think that their self-affirmation has been requested by and will be read by important figures in the environment (e.g., by a student's teacher). This hypothesis awaits test.

Stereotype Lift and Social Belonging

Finally, some research suggests that social-relational processes also contribute to *stereotype lift*—the performance boost experienced by nonstereotyped students when they know that an outgroup is negatively stereotyped on a task (Walton & Cohen, 2003). If apprehensions about how one is viewed and whether one is valued contribute to stereotype threat, a sense of assurance that one will be viewed positively and valued might contribute to stereotype lift. In one study, White students took a test that they were told was evaluative of intellectual ability or that was, in addition, fair for different racial groups (Walton, Thomas, & Cohen, 2003). Participants exhibited stereotype lift—they scored better when the test was described as evaluative. Additional measures suggest that the manipulation assured participants of their social standing. In the evaluative condition, participants reported more confidence that they would be viewed well by others (higher social state self-esteem) and less worry about proving

their ability by performing well (lower performance goals). Moreover, these patterns and the performance results were stronger the more participants activated race-related concepts as assessed by a word completion measure (Steele & Aronson, 1995). The more participants thought about race and could benefit from negative stereotypes about an outgroup, it seems, the more they could relax and feel assured they would be well-received in the setting and the better they performed.

The Quinn (2009) study provides complementary evidence for the role of social-relational processes in stereotype lift. Just as the performance of students with a history of mental illness dropped only when they had disclosed this history (but not when they were reminded of it), so the performance of students without a history of mental illness increased only when they had disclosed its absence (but not when they were reminded of its absence). The results imply that stereotype lift arises in an interpersonal transaction.

Social Belonging in Field Settings

The research described above suggests the potential importance of social belonging in shaping the experiences and achievement of people from negatively stereotyped groups in mainstream school and work settings. But this research was all conducted in psychology laboratories. How does social belonging affect the real-world academic experiences and achievement of negatively stereotyped students? Research investigating this question comes in two forms: correlational longitudinal research and intervention field experiments.

Correlational Longitudinal Research

Longitudinal research shows that negative stereotypes can lead students to feel they do not belong in academic environments and undermine their achievement motivation over time. For instance, Mendoza-Denton, Downey, Purdie, Davis, and Pietrzak (2002) tracked African

American students' experiences in the first several years at an elite, predominantly White college. They assessed individual differences in students' sensitivity to race-based rejection (RS-Race)—the anxious expectation of being rejected on the basis of race. African American students who were high in RS-Race experienced a lower sense of belonging in the university. They also exhibited a semester-by-semester decline in grades over the first two years of college. By contrast, students low in RS-Race maintained a steady level of academic performance. Further, high levels of RS-Race seemed to interfere with students' ability to effectively engage with the academic environment—for instance, these students experienced greater anxiety about discussing academic problems with instructors and attended fewer review sessions than those low in RS-Race.

A second longitudinal study tracked the experiences of women enrolled in a challenging college calculus course (Good, Rattan, & Dweck, in preparation). It explored how negative stereotypes about women's mathematical ability and the perception that such ability is fixed rather than expandable affect women's sense of belonging and performance in math. The study found that women who felt that others in their class endorsed negative gender stereotypes and who believed that math ability was fixed experienced a lower sense of belonging in mathematics over time. This lowered sense of belonging, in turn, was associated with less interest in pursuing math and with worse math grades.

Intervention Field Experiments

If worries about social belonging undermine the achievement of negatively stereotyped students, would buttressing students' sense of belonging improve their outcomes? As will be seen, even brief social belonging interventions can yield strikingly large and long-lasting benefits for stereotyped students in real-world school setting (e.g., Walton & Cohen, 2007, Experiment

2). This contrasts with many large, costly interventions in education that have little or no effects, or effects that dissipate rapidly with time. While striking, there is precedent for brief psychological interventions to have large, long-lasting effects (e.g., Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Cohen et al., 2009; Wilson, Daiani, & Shelton, 2002). In general, psychological interventions may continue to exert positive effects long after their delivery because they curtail negative cyclical processes that undermine outcomes over time and replace them with positive cyclical processes that improve outcomes over time. For instance, a student who comes to feel secure in her social belonging in school may anticipate better interactions with peers and instructors. This expectation may improve interactions with others and help the student form strong social bonds that sustain high levels of motivation and performance. The capability of brief psychological interventions to initiate powerful self-reinforcing processes that improve students' achievement over time makes their applied promise especially exciting. Further, these processes raise significant new empirical and theoretical questions.

The *social belonging intervention* was developed primarily in response to research suggesting that ethnic minority students' experience in academic environments is particularly labile (e.g., Aronson & Inzlicht, 2004; Mendoza-Denton et al., 2002; Walton & Cohen, 2007, Experiment 1). For instance, as described above, ethnic minority students may experience a state of belonging uncertainty (Walton & Cohen, 2007) where negative social events—such as critical feedback from an instructor or feelings of isolation—carry a more global and threatening meaning to minority students than to others. Such events may lead minority student to question their belonging on campus in general and undermine their motivation.

The social belonging intervention was designed specifically to prevent such deleterious

conclusions. To do so, the intervention provides students an alternative, non-threatening explanation for negative social events in school (Walton & Cohen, 2007, Experiment 2). It conveys to students that worries about belonging and negative social experiences are normal at first in a new school and not reflective of an actual lack of belonging on their part or the part of their social group. Further, the intervention conveys, such experiences dissipate with time such that with time they, like other students, will come to feel at home in the school (cf. Wilson et al., 2002).

The intervention was first tested among Black and White first-year college students attending an elite university. Students read the results of a survey of ethnically diverse upper-year students at their school. The survey indicated that negative social events and feelings of non-belonging are normal in the transition to college, experienced by students of all ethnicities, and dissipate with time. These materials were designed to lead students to attribute these difficulties to the challenges of the transition to college, rather than to a lack of belonging. The message was reinforced using "saying is believing" procedures: Students wrote an essay about the process of change in students' experiences in college over time and then delivered their essay as a speech to a video camera. They were told that the video would be shown during freshman orientation the next year to help future students better adjust to the college environment (cf. Aronson et al., 2002). In the control condition, the procedure was the same but students were exposed to information irrelevant to issues of belonging (e.g., change in students' social-political attitudes). In total, the treatment lasted approximately one hour.

For White students, who have little cause to doubt their belonging in school on account of their race, the treatment had little effect. However, the treatment had powerful benefits for Black students. In the week following its delivery the treatment buffered Black students' sense of

social belonging against negative social events. Whereas in the control condition Black students' sense of social belonging dropped precipitously on socially adverse days, in the treatment condition their belonging stayed high even on adverse days (Walton & Cohen, 2007, Figure 3). The treatment also increased Black students' self-reported achievement behaviors; for instance, Black students reported studying nearly an hour and a half longer each day in the treatment condition than in the control condition.

Most important were effects on academic achievement, as assessed by official school records. The next semester Black students in the treatment group had grades that were one-third of a grade-point higher, both as compared to the randomized control group and as compared to all Black students campus-wide but who had not participated in the study (see Walton & Cohen, 2007, Figure 5). Again White students were unaffected.

Subsequent analyses tracked students' academic outcomes through senior year (Walton & Cohen, in preparation). These analyses combine students in the original sample with students in a second cohort. They also compare the belonging-treatment to multiple randomized control groups and to the campus-wide comparison group. The treatment effect continued and significantly increased Black students' grades over this 3-year period. Whereas in the control condition Black students' grades showed no growth over time—no improvement from freshman through senior year—Black students in the belonging-treatment condition showed a steady semester-by-semester rise in GPA. Overall, the social belonging intervention administered in the spring of students' freshman year reduced the White-Black gap in raw GPA from sophomore-through-senior year by 52%.

Mediation analyses suggest how the intervention raised Black students' grades. As noted, in the week following the intervention, Black students' feelings of belonging became less

vulnerable to adversity on campus: adverse social events no longer carried a global or symbolic meaning to Black students. This reduction in the contingency of Black students' feelings of belonging—not the mean level of belonging students reported nor the mean level of adversity they experienced—statistically mediated the long-term gain in Black students' GPA. The intervention improved outcomes by securing Black students' belonging against adversity, not simply by raising their levels of belonging.

Subsequent research has tested variants of the social-belonging intervention in diverse populations. One study delivered the treatment to ethnically diverse 6th grade students entering middle school (Walton, Cohen, Garcia, Apfel, & Master, in preparation). Regular surveys conducted over the subsequent three years of middle school showed that, as compared to a randomized control group, the treatment reduced Black students' self-reported uncertainty about social belonging over this period and eliminated the emergence of high levels of perceived stereotype threat in 7th grade. The treatment also improved Black students' grades in 8th grade and attenuated an increase in disciplinary incidents among Black boys over middle school.

A third study tested the belonging-intervention among men and women entering a selective university engineering program (Logel, Walton, Peach, Spencer, & Zanna, under review; Walton, Logel, Peach, & Spencer, in preparation). Because participants in this study were enrolled in different engineering majors, this study provided an opportunity to test how the effects of the intervention were moderated by context. Some students were enrolled in relatively diverse majors (e.g., environmental engineering) where 25% or more of students were women. Others were enrolled in male-dominated majors (e.g., electrical engineering) where fewer than 20% of students were female. If women experience the greatest level of threat in male-dominated majors (Murphy et al., 2007), the intervention could be most needed and thus most

effective for students enrolled in these majors.

The primary outcome was first-term grades, combining across two cohorts of students. Among students enrolled in gender-diverse majors, there was no gender difference in first-term GPA in the control condition and no effect of the intervention. The absence of a gender difference mimics the pattern found on pretreatment measures: men and women entered the university with similarly high levels of prior achievement and preparation. The results suggest that, in these majors, women did not experience high levels of threat.

By contrast, in male-dominated majors there was a large gender difference in first-term GPA in the control condition—men outperformed women. This gender difference emerged even though men and women again entered the university with identical levels of prior achievement and preparation, suggesting that in these majors women experienced high levels of threat that undermined their performance. And here the belonging intervention had a large effect. It raised women's grades and fully eliminated the gender difference in GPA. Moreover, this effect was mediated by a change in women's feelings about the belonging of their group in engineering as assessed at an implicit level. The belonging-treatment led women to associate "most people like" and "female engineers" more easily along an IAT-like reaction time task, and this mediated the treatment effect on grades.

These results illustrate both how contexts can give rise to threats that undermine negatively stereotyped and underrepresented students' feelings of belonging in academic environments, even students who are highly skilled and qualified, and how addressing these issues of belonging can improve students' academic outcomes.

Conclusion

Many of the factors that contribute to inequality in education are exceedingly difficult to

remedy, such as high and intractable levels of poverty in many ethnic minority communities, inequality in school funding, in teacher quality, and so forth (Jencks & Phillips, 1998). In this context, the investigation of psychological processes that contribute to group differences in academic achievement—and of brief, uniquely psychological interventions that remedy these processes—is especially promising. The research reviewed in this chapter illustrates how negative intellectual stereotypes can threaten minority-group students' feelings of belonging in mainstream settings and undermine their experiences, motivation, and achievement. Further, this research illustrates effective strategies to allay belonging concerns. An important implication of this research is that students from negatively stereotyped groups have an enormous amount of untapped intellectual potential in school, and that this potential can be hidden by belonging-related psychological threats (Walton & Spencer, 2009). This research provides hope that effective remedies, implemented at a large scale, could remove one barrier to high levels of academic achievement among ethnic minority students and women in quantitative fields—and help to create academic contexts in which the young Michelle Robinsons and Sonia Sotomayors going to school today can reach their potential. In addition, this research underscores important theoretical lessons. Whereas most past research emphasizes the role of individual factors in producing high levels of achievement motivation such as feelings of self-efficacy and of autonomy, the research reviewed in this chapter illustrates the profound importance of students' feelings of belonging and connectedness to others in creating and maintaining high levels of motivation (Walton & Cohen, in press).

To date, interventions to buttress students' sense of belonging in school have targeted students' own experiences and perceptions. In closing, we suggest that in some circumstances it may also be important to improve the school environment itself, for instance to reduce prejudice present there. Research testing such interventions can pose challenges; for instance, the

environment (e.g., classroom) may become the unit of analysis for statistical purposes. But when bias in the environment itself directly undermines women and minorities' experience and achievement (see Logel et al., 2009), to reliably improve students' experiences, it may be necessary to simultaneously buttress students' feelings of belonging and to improve the objective environment.

Appendix A: Policy Box

Most reforms in education end at the classroom door or, at most, in the teacher's chair. They do not directly target students' experience. Reforms like more equitable school funding, new governance structures, merit pay, new accountability systems, and so forth emphasize structural factors and/or incentives. Although these factors can create educational opportunities, we suggest that equally important is students' psychological experience in and subjective construal of school—what school feels and looks like to students. A central task of educational reform should be to improve students' psychological experience in school, for example to mitigate the worries of a student who sits in the back of the class feeling isolated and lonely, wondering whether her classmates or teacher view her through the lens of a negative group stereotype.

The research reviewed here shows that, as a consequence of numeric underrepresentation and negative stereotypes, members of marginalized groups may chronically wonder whether they belong in school settings. This worry causes negative social events in school to loom large in meaning to students, undermining motivation and achievement and contributing to group differences. This process is fundamentally psychological; it necessitates a psychological remedy (Walton & Dweck, 2009; Walton & Spencer, 2009). Educational reforms should build on existing psychological interventions to develop ways to buttress a sense of belonging in school among large numbers of students. It will be challenging to do so. But psychological interventions hold great promise. They can fuel engagement and performance and produce a cascade of benefits. And without them, students may not be able to take full advantage of educational opportunities delivered through structural changes or to perform to their potential.

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